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Selected Personality Variables and the Learning Process

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I. INTRODUCTION

Changes in overt behavior or verbal performance following practice with some verbal or motor task have generally been considered as evidence of learning. These changes of behavior have been primarily investigated from two approaches: *(a)* studying the resultant changed behavior; and *(b)* studying the processes leading to the observed changes in behavior. While both of these approaches are essential, they must be related to a third variable: the nature of the individual involved in the task. It is in the light of the needed research in the relationship between the learning situation and the personality of the learner that the present study has been initiated.

We are here making the initial assumption that certain relatively stable personality characteristics exist which are reflected in the individual's handling of the learning situation. Freud asserted that the thinking processes were conveyors of underlying feelings, and that there seemed to be a definite connection between the thought processes and the other processes occurring simultaneously within the individual. This position has been taken for the present investigation, which aims to demonstrate the relationship between the individual's kinds of thinking and selected personality characteristics.

In an attempt to get at the manner in which the individual's personality characteristics are manifested in the learning situation, the present study is designed to investigate the relationships between the recalled verbalizations of associations experienced in a series of learning situations over a period of four months by a group of college students in the University of Chicago, and personality characteristics as inferred from test protocols of the Rorschach ink blot test. The specific questions we were here interested in investigating were:

1. What is the relationship between selected personality characteristics (viz., anxiety, rigidity, negativism) and the kinds of thoughts a group of college students have in a series of learning situations?

2. What is the relationship between selected personality characteristics and products of learning, where such products can be inferred from test performance?

Many investigations have attempted to

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formulate concepts linking levels of individual functioning conceived as parts of one process. Research in social psychology and perception has indicated clear relationships between perception and personality. The present study is a departure from these lines insofar as mental processes going beyond immediate perceptions are studied objectively in an effort to understand how they relate to some general and stable personality characteristics. Here we are attempting to investigate the relationship between the more highly cognitive ability of problem solving and personality characteristics.

II. THE METHOD OF STIMULATED RECALL

A. Background

The class situation is a process consisting of overt, observable behaviors or activities and nonovert behaviors or private experiences of both the teacher and the students which defy observation. Until the present, the major source of evidence for studies of classroom learning and procedures has been the investigation of the overt behaviors. Where mental processes of students have been considered, they have been assumed or inferred from the overt behaviors. Those who propose theories about learning acknowledge that some kinds of mental activities, as well as physical activities, are involved in the learning process. The physical activities are presumably accompanied by certain conscious and unconscious activities. The techniques for obtaining evidence of learning, however, are limited by current methods to data of physical activities, i.e., overt, observable behaviors. The conscious and unconscious mental activities regarded important for learning are less readily observable.

The extent to which mental processes can be inferred from overt behavior is limited since specific behaviors are not necessarily accompanied by the same mental processes in different individuals. Any attempt to infer the mental processes from observations of overt behavior is subject to much error, since a variety of mental processes may lead to the same end product. And unless additional evidence is gained about the *processes* involved, the investigator cannot be certain of his inferences.

In the attempt to obtain evidence of the thoughts occurring in a learning situation, subjects have been asked to observe their thinking while participating in an activity and to report this upon the completion of the task. Titchener (19) had his subjects think aloud while engaged in problem solving. Often, the process of observing one's own thinking affected the very behaviors the experimenter was interested in investigating. The attempts to obtain evidence of the conscious processes by asking participants to report and record their thoughts during a given situation have not been very successful. Bloom (1) noted that it was not feasible to have psychologically naive subjects both participate in an activity and simultaneously observe their participation. On the other hand, if psychologically trained subjects are to give introspective accounts as they participate in an activity, their training and psychological sophistication would render them poor subjects for investigating many complex social situations such as learning a subject at the college freshman level.

B. The Method of Stimulated Recall

The method of Stimulated Recall, introduced by Bloom (1), is a promising technique for attempting to get at the conscious thoughts of the individual. Basically, this is a technique which attempts to get at the conscious thoughts, ideas, and experiences an individual has had in a learning situation. This method is based on the assumption that given enough of the original situational ma-

terial (i.e., cues from the class session), the individual will be stimulated to recall not only the original overt activity (i.e., the verbal and physical behaviors of the class situation) but his own private experiences as well. Sound recordings made of the class discussion are played back to the participant in an attempt to stimulate recall of his thoughts. It is these recalled and reported experiences that become the data obtained with this technique. No special training is required for the subjects to recall and report their thinking. This participant-observer method, unlike introspection, permits full, unhampered, and free participation of the subjects during the original situation. Thus, the individual becomes both the participant and the observer.

The method of stimulated recall lends itself not only to providing reports of the mental activity occurring concurrently with certain overt activities, but also in making comparisons of all members of any situation at a defined period. This method is applicable to group situations in which there are many participants and where considerable overt verbal activity occurs. It is assumed that the sound record will provide sufficient cues of the original situation for the participant to recall his experiences. Within a 48-hour period following the original situation, each participant of the group is individually interviewed and the sound record is played back to him. At specific, preselected points in the discussion, called *Critical Points,* the recording is stopped and the subject is asked to recall and report the thoughts he experienced in the situation at this particular portion. The reports given at the stops of the recording provide evidence of the conscious processes.

III. THE COLLECTION OF THE DATA

A. The College as a Learning Context

Education in the College of the University of Chicago is based on the idea that the students take general courses in several major areas, with work presented principally through small discussion classes. Supervision of the student's work is considerably less than in high school. A student's standing is measured solely by performance on comprehensive examinations given at the end of the school year, rather than by such indices as class attendance, teacher grades, or teacher-constructed tests given during the year.

At entrance, records of previous academic work are not considered in determining the student's course placement. The need for standard measures of competence, in view of the variety of backgrounds of the students, has led to the placement-examination program. While school records provide some indication of previous training, a list of credits is often an inadequate basis for determining the point at which the student is prepared to begin his studies in the College. Some entering students have completed but ten grades of schooling, while others have had several semesters of college work. The development of these placement examinations has served to indicate the level of courses and the number of courses to be taken by the applicant, in terms of his particular academic needs.

At the outset, it must be pointed out that the subjects used in this investigation, if representative of the University of Chicago College entrants, are not representative of the *usual college fresh-*

man. As noted by Cronbach (4), they are intellectually extremely superior and have special motivations which cause them to seek out the Chicago program. The context in which the entering College student finds himself is one of intellectually superior and aggressive students with high motivation and a keen sense of competition. Every attempt is made to meet the individual's intellectual needs and abilities, both in the initial screening of applicants and in the placement of the admitted students in the course. It is within this type of context that the present subjects were drawn and the study was conducted.

B. The Subjects

The subjects for this investigation consisted of members of one intact Social Science I class of 11 students, registered for the first time in the College of the University of Chicago. These 3 female and 8 male students ranged in age from 15 to 22 years. These subjects were simultaneously registered in either Mathematics I or Humanities I, in addition to the Social Science I course. This class in Social Science, selected as the parent course, was chosen because of the degree of involvement afforded the student by the subject matter presented therein. The range of materials covered contains strong implications for everyday life beyond the college situation, serving to arouse a greater sphere of thinking related to personal values and attitudes. The topics covered succeed in involving the students in a manner not usually possible with subject matter such as mathematics, chemistry, or a foreign language.

C. Procedures in Data Collection

We were interested in determining the manner in which selected personality characteristics are manifested and employed in varying types of learning situations. The present investigation is based on three types of data: *(a)* the conscious thoughts or ideas experienced in the classroom and reported in individual interviews over a period of four months; *(b)* ratings of Rorschach test protocols; and *(c)* performance results on achievement and aptitude tests given college students.

1. *The Conscious Ideas*

In order to familiarize each class with the presence of the recording equipment and the investigator, preliminary class recordings were made. Prior to the initial recording, each of the 11 members from the class selected for study was individually interviewed in an attempt to secure his cooperation for this study. Each student was informed that a series of individual interviews would be a necessary part of the investigation, and would extend over a period of 4 months. At the time of the initial contact interview, the students were not informed as to the nature of the interviews that would be conducted. Each person interviewed consented to participate in the investigation.

Each class studied was recorded for the full 50-minute session. From the class discussion, statements made by students or read from the text which appeared to have the most group involvement were selected to serve as critical points during the interview sessions to stimulate the recall of the original thoughts. An attempt was made to select those class materials that would lend themselves to maximum personal meaning and involvement on the part of the students, as well as to include many types

of classroom verbalizations in the 10 to 15 statements or phrases selected from each class. No method, however, was devised for a random sampling of these statements.[2]

Within a 48-hour period of the class recording, each subject was individually interviewed. At the beginning of the first interview, the following directions were given each subject:

> The College has been interested in studying the effects of teaching and class procedures used here. In the past, recordings of the class sessions have been made and studied in great detail to enable the instructors to become more sensitive to their own teaching methods. Now, in addition, we are interested in investigating the kinds of things that students think about during the class discussion.
>
> The method that we are making use of here is to play back the recorded session of the class in which you participated this morning [yesterday or this afternoon]. The record which I have here will be played back to you in order to help you recall the thoughts and ideas you had while the class was going on. This is similar to asking you to recall your tenth or twelfth birthday if I should tell you about the gifts you received or the songs that the guests sang to you.
>
> It is unlikely that you will be able to recall very much at first, but as the recording of this class is played back to you, and as you get more of the feeling for the class session, you should be able to recall more and more of your classroom thoughts.
>
> As the recording is played back to you, I shall stop it from time to time at certain points, and I shall ask you to recall what you were thinking about during the original situation. Feel free to recall and relate any experiences or ideas you had in the class situation, no matter how trivial or irrelevant you may feel them to be.
>
> If you recall any ideas or experiences you had during selections of the recording at which I do not stop, tell me, and I shall stop the recorder. Anything that you tell me will be recorded verbatim. This information will be held in confidence, and will not be shown to any of your instructors or used in any way to evaluate your work here in the College. Have you any questions before we begin?

The verbatim reports of the experiences and ideas recalled at the given critical points of the subjects provided the major portions of the data for the present investigation. Henceforth, these recorded reports will be referred to as the *conscious experiences or conscious ideas*. A sample of 107 overt critical points was used at which the subjects were questioned for their recall of class experiences. This total included 77 preselected points, and 30 points at which the subjects volunteered their experiences. A total of 2166 conscious idea units was reported. Of this amount, 1937 units were actually experienced in the class situation, and 229 units were volunteered as a function of the interview situation.

2. *The Projective Test*

Each of the 11 subjects was individually administered the Rorschach ink blot test during the last month of the investigation period. Test administration was delayed until all of the interviews had been secured, since it was felt that the unstructured nature of the Rorschach, plus the common misunderstandings of the nature of the ink blot series, might arouse resistance and possibly serve to terminate the interviews, vitiating our original design. The ratings of various dimensions of personality inferred from the Rorschach constitute our second source of data.

3. *Test Situational Data*

Entrance Tests. Each College applicant is given a series of entrance tests consisting of the *American Council on Education Psychological Test* (ACE), a *Reading*, and a *Writing Achievement* test.

[2] The proportions of the various overt verbal behaviors selected for presentation to the subjects, however, were approximately the same as the random sample selected from the data for the entire study, determined by selecting every fourth statement throughout the entire typescripts of the recordings.

Evidence gathered over a period of years has indicated the value of these tests for predicting success in the College; and the test scores constitute part of the information used in admitting applicants.

Placement Examinations. Upon being admitted to the College, each student is given a series of placement examinations. These tests are planned to measure skills in reading, interpretation, and the solving of problems, as well as general subject-matter knowledge. The results of this series of tests, covering all areas of college work, are used as an index for placing students in the courses geared to individual needs and abilities. On the basis of placement-test achievement, students may be classified in four groups in each subject field:

a. Those who have competence equivalent to that called for by a particular comprehensive examination and are excused, therefore, from the examination.

b. Those who have mastered a certain portion of the knowledge and skills covered in a comprehensive examination and are advised, therefore, to take only a part of the course offered in preparation of the examination.

c. Those who have not acquired sufficient understanding and skills to pass a particular comprehensive examination without first taking the entire course in preparation for the examination.

d. Those who are likely to fail in their examination unless they receive special training in addition to the preparation regularly offered in the course.

The performance of all of the 11 subjects on the examination fell into Category *c*. Because they had not acquired sufficient understanding and skills to pass the placement examination (i.e., and go on to the next course in the Social Science sequence), this is assumed relatively constant for the group.

College Achievement. The use of the ACE provides some index of potential ability the student brings with him upon entrance, as well as some basis for the prediction of his subsequent school success. The placement examinations provide a measure of achievement *at the time of entrance.* The third type of data obtained was individual performance on the Social Science I Comprehensive Examination. This comprehensive examination, constructed by a central committee, is given at the end of the year. The examiners work closely with the instructors in the preparation of the test, but the final form of the examination is prepared by the central committee of examiners. Final grading is made without knowledge of the identity of the writer of the paper, to minimize bias.

The comprehensive examinations are composed of a series of parts designed to tap a variety of behaviors and skills that meet the objectives of the College. It is recognized that the single grade given the student for achievement on the examination does not adequately describe his performance, since it is unlikely that performance is consistently at the same level throughout the various processes tested. Some parts of the examination represent subject-matter divisions and facts, while others call for the ability to analyze and organize new or familiar subject matter. The areas of the Social Science I examination are fully presented in Part IV.

In summary, three kinds of test situational data were collected: one of aptitude (ACE) and two of achievement. One form of achievement is based on work previous to entering the College, while the comprehensive examination is a measure used after subjecting the student to a series of specific learning materials in a systematic fashion.

4. *The Rorschach Results*

In our selection of the kinds of rela-

tively stable personality characteristics that would become manifest in the learning situations, two criteria were employed:

a. Can the personality characteristics, assumed to be stable, be inferred from the Rorschach records with sufficient reliability (at the 5 per cent level) by two judges?

b. Can the kinds of personality characteristics previously studied and reported in the literature become manifested in the kinds of data obtained here?

Among the personality characteristics studied in the literature have been (*a*) free floating anxiety; (*b*) negativism; (*c*) rigidity; and (*d*) aggression. It seemed of interest to attempt to relate these characteristics as evidenced on a projective test, with the indices of intelligence and accomplishment used here (ACE, achievement tests, and grades).

Rank-order correlations were computed between ratings made independently by two Rorschach experts. Use was made only of those ratings whose reliability coefficient[3] was .601 or over (significant at the 5 per cent level). The correlation between negativism and aggressiveness (.67) was high enough to lead us to believe that one may be but a facet of the other, and separate treatment would not add to the interpretation of the data. The ratings made by the two experts were pooled, and were then assigned each subject.

5. *The Conscious Behaviors*

A system of classification of the recalled conscious experiences was developed for the present study. Each separate idea, in many instances a clause or phrase, served as the unit for classification. This unit of division, here called the *idea unit*, was selected, since it appeared that a classification division based on the number of words spoken, or on all materials expressed at one critical point, would serve to obscure the richness of the obtained data. The need for this particular system[4] of classification becomes clear when material such as the following is expressed at one critical point:[5]

> Donna:/ When I first heard of the survival of the fittest in biology class in high school and the Darwinian theory, well, I was thinking of this./ Thought I would like to learn more about all of this./ This expression surprised me, for I never heard about the Judeo-Christian tradition. People usually just say "Christian Tradition."/ I was laughing at Jack's expression, "Someone tried to hit me over the head." I wasn't thinking about it. It just amused me./ I agreed with Mr. X— (the instructor)./ I wondered what the word "progeny" meant, and where he got it./

Where more than one discrete thought was reported at a particular point in the original situation, each idea was classified as a separate unit according to the method of division adopted here. It was the rare critical point that stimulated the recall of only one idea unit.

In addition to the ideas actually experienced in the actual class situation, the following kinds of thoughts and information were reported:[6]

> 1. Ideas experienced immediately preceding the critical-point stop. This was usually presented by the subject to give continuity to the ideas expressed during the interview.

[3] Spearman rank-order method.

[4] At best, the classification of any qualitative material is subject to some distortion once it has been removed from its original context. The classification title is but a convenient symbolic shorthand that lends itself to a more facile treatment of the data than would be the case if it were left in its original context.

[5] The unit division is indicated by a diagonal bar.

[6] These were not used in the analysis of the data reported here, however.

2. Explanatory remarks made in reporting the actually experienced ideas. These were usually given for the benefit of the interviewer. These ideas were recorded in a special way to take care of their source of stimulation as attributable to the interview situation itself.

3. New ideas and associations which the individual experienced during the interview situation. These comments usually arose as explanations, attitudes, or individual perceptions of classroom situations, the instructor or classmates' behavior. Most common, however, were affective feelings of the self, and progress the individual felt that he had been making.

4. Reports of the overt behavior or conscious experiences following those at the critical point.

Source of Thought. Each idea unit was classified according to the stimulus or *objective source* of the idea, as inferred by the judges from the subject's report. This classification dealing with the source of the idea units will, henceforth, be referred to as the *Source of Thought.*

A tenfold classification was developed in an attempt to describe the sources of ideas during the actual classroom process. This classification may be broken down into the degree of relevancy and desirability for classroom thinking:

1. The highest degree of concentration in the classroom would be problem-oriented thinking concerned with the topics of the educational experience. Here, we would expect the source of thought to be the ideas directly under consideration. Included here were the categories: *(a) ideas under consideration;* and *(b) a related idea.*

2. Just beyond the immediate subject matter may be found kinds of thinking not directly stimulated by the problems discussed. Here the ideas stem from the course materials in the form of reading in the text, looking through notes, or working problems. Included here was: *(c) activity related to the class or subject independent of the ideas directly under consideration.*

3. Not related to the class material, but still *confined to the class situation,* is the student's thinking about people in the classroom. The instructor, classmates, and the self are all included here in the categories labeled: *(d) self; (e) teacher;* and *(f) another student in the class.*

4. Thoughts stimulated by stimuli within the class situation may include: *(g) objects within sight or hearing;* and *(h) classroom situation and/or process.*

5. The student may introduce stimuli external to the class process and surroundings. These are signs of distraction and diversion in the class experience and include: *(i) someone not in the classroom;* and *(j) some concrete object or situation not in the immediate environment.*

6. For units not appropriate to the above ten areas, a special category entitled *unclassified* was employed.

Discomfort-Relief Quotient. A modification of the Discomfort-Relief Quotient (DRQ) developed by Dollard and Mowrer (5) was employed for classifying this dimension of the experienced ideas. As a measure of progress in case work, these authors obtained the DRQ by having judges divide the transcripts of the protocols into clauses and thought units. Each unit was classified as an expression of discomfort, relief, or neutral affective tone, and the tension index was in the form of:

$$\text{DRQ} = \frac{\text{Number of Units of Tension}}{\text{No. of Tension Units} + \text{No. of Relief Units}}$$

Methods of classification of units set up by sentences, paragraphs, or pages were reported by these authors. But the idea unit, as adopted for the present study, was reported as being most reliable.

On this basis, the following classification was employed here:

1. Direct expression of relief, lowered tension, or satisfaction.

2. Direct expression of discomfort, tension, or annoyance.

Clearly, the use of only statements of direct expressions of satisfaction or dissatisfaction would result in discarding much of the data. Consequently, two other categories were developed to include units where no explicit expression of affect existed:

3. Inferred relief, lowered tension, or satisfaction.

4. Inferred discomfort, tension, or annoyance.

To account for units without affect or positive or negative tone, two additional categories were set up:

5. Neutral
6. Ambiguous and/or ambivalent.

Orientation of Thought. While many individuals may be aroused by the same stimulus (our *Source of Thought* classification), each individual may handle and treat these stimuli in differing ways. Some classification seemed desirable here to take into account the differing characteristics and treatments and orientations of the idea units reported. In this classification, henceforth to be referred to as the *Orientation of Thought,* no attempt was made to judge the quality or the appropriateness of the reported experiences. The basis for describing any content was to be found in the idea unit.

In brief, a classification believed to lend itself to describing the orientation of class experiences was developed. Four kinds of general content trends were evidenced in the obtained data:

1. Active thinking or problem solving, indicating an actual awareness and comprehension or evaluation of the topics discussed. Included here were the categories *(a) active participation; (b) evaluation;* and *(c) comprehension.*
2. Passive thinking about class topics, indicating an awareness of the problem but not an active consideration. This category was labeled *(d) passive participation.*
3. Under the broad heading of *Diversions* were included the reports of emotional reactions and attitudes about the self, other people, and class materials. Categories contained here were: *(a) individuals and their characteristics; (b) ideas and words;* and *(c) concern about the self.*
4. Reports of class activities and conditions. This category was labeled *(d) other activities.*

In addition, the classification of III. *No recall* was included to account for the failure by the subject to remember the ideas experienced in the class at the preselected critical point.

Each of the first eight general categories of the above ninefold classification was subdivided. (See Appendix for a complete description.) Each idea unit, taken from the written typescript of the reported experiences, was classified as to *one* kind of orientation of thought.

In the ordering of qualitative data, the danger of the classifier's own bias exists; and lack of awareness of this bias on the part of the investigator may serve to distort the results obtained. At the outset of this investigation, in order to minimize classifier distortion, it seemed advisable to adopt a systematic bias in classifying the idea units both for *Source of Thought* and *Orientation of Thought.* The bias adopted was in the direction of the desirable learning in the college situation. In the ordering of the Units, a hierarchy extending from class-oriented thinking to individual-centered experiences was set up. Wherever a choice was possible between problem-oriented and self-oriented thinking, preference was in the direction of the former.

6. *Objectivity of Classification*

The ability of other judges, in addition to the investigator, to learn the present classification systems and to apply them in the same fashion was the basis for the criterion of objectivity used in evaluating the categories here developed. All interview protocols were divided into idea units independently by the investigator and one judge to obtain an index of objectivity of idea-unit division. In addition, all of the protocols were classified by two judges plus the investigator for the *Source of Thought, DRQ,* and *Orientation of Thought.*

A practice session was held with each judge during which a random sample of idea units was coded. Differences in interpretation were then discussed in order to establish a common frame of reference among the judges and the investigator. Pearson product-moment correlations[7] were computed between the classifications of the two judges.

Agreement of Content Unit Division. All interview protocols were divided on the basis of the idea unit. Judgments were to be based solely on the completeness of an idea per se. *The agreement on unit division obtained between the judge and the investigator was 98 per cent.* For the remaining 2 per cent of units in which there was disagreement, the judges met to reconcile the differences. The high percentage of agreement obtained indicated sufficient objectivity to allow us to proceed to the other classifications.

Objectivity of the DRQ Category. Eleven interview protocols from one class were given to three judges with comparable psychological training, to make judgments of the modified *DRQ*. Two of the judges were instructed to make their judgments on the basis of deliberate exclusion of the possible psychological significance or implications of the responses. Judgments were to be made on whether the individual actually said or implied satisfaction, tension, etc. The correlations between judges and the investigator, based on 277 idea units, were as follows:

$$r_E \text{ \& Judge } A = .90$$
$$r_E \text{ \& Judge } B = .89$$

Judge *C* was given equal familiarity with the classification scheme but with one further instruction: to make inferences, with attempts to get at the psychological significance of the expressed and inferred hedonic tone. Correlated with the classification made by the investigator on the same basis, the obtained value of *r* was .69. While lower in magnitude than the coefficients obtained when the idea units were classified on actual report, as adopted here, this value does indicate that the objectivity of both types of classification is high.

Objectivity of the Orientation-of-Thought Categories. The same 11 interview protocols were classified by one judge and the investigator, and objectivity of classification in broad categories was measured by the Pearson *r*. A value of .94 was obtained. A reliability coefficient of .64 was obtained for classification of the subcategories of the nine major divisions. These values indicate that both classification in broad and subcategories of the orientation of thought was sufficiently objective for use here.

Objectivity of the Source-of-Thought Category. A sample of 277 idea units was classified by one judge and the investigator for source of thought. The obtained reliability coefficient was .95. All of the above correlation values are significant, and we may conclude that the classification system developed and used here is of sufficient reliability and objectivity to serve as a basis for testing our hypotheses.

[7] It is recognized that the assumptions (e.g., continuous variable, homogeneity, homoscedasticity, numerous arrays) for the computation of the Pearson *r* were not met here. The most appropriate measure here would have been use of the contingency coefficient. Since many of the *theoretical* cell frequencies were less than the value of five, the value assumed necessary by Edwards (6) for legitimate use of this method, contingency coefficients were not used. The obtained values of the Pearson *r* do indicate, however, a high level of agreement between the judges as to the objectivity of the classification categories developed.

IV. ANXIETY IN THE LEARNING SITUATION

A. Anxiety as Measured by the Rorschach

The Rorschach record is capable of providing two types of indices of anxiety. With a well-systematized type of anxiety, i.e., what May (13) has termed *neurotic anxiety*, the individual has already produced a neurotic defense system, evidenced by marked changes of personality structure, resulting in both compulsive and hysterical personality characteristics. Klopfer and Kelley (11), however, suggest that this type of anxiety is less likely to become manifest on the Rorschach protocols. They write that it is the reactive depression or anxiety state, referred to as an unsystematized anxiety, that affects the record more easily. Carried one step further, it is an inner tension of a generalized "free-floating" nature, and represents an ineffective effort (as inferred from the record itself) to intellectualize the anxiety. Neurotic anxiety, moreover, involves the mechanism of repression, and differs from this free-floating or normal anxiety by its symptomatic nature. In May's words:

> Normal anxiety [is] that which is used for a constructive solution to the problem which causes the anxiety, and neurotic anxiety [is] that which results in defense from avoidance of that problem (13, p. 199).

Following May, anxiety is here conceived as a pervasive inner tension motivating the organism to protect itself against anticipated psychic pain. Since individuals differ with respect to ego strength or inner psychological security, it is reasonable to suppose that they also differ with respect to anxiety level or readiness. Correlatively, there may exist individual differences in the amounts of anxiety which can be handled without resorting to maladaptive responses. If anxiety exceeds the adaptive threshold, then rigid, *emergency* behavior may result. The individual's response latency, and thus his ability to perform noegenetically, is reduced, with the result that he is forced back upon familiar, habitual responses inappropriate in the given situation.

From these considerations, we may derive our two hypotheses: Hypothesis I: *If the anxiety is above individual threshold, it leads to an impairment in the ability to improvise in an unstructured and/or new situation.* This results in stereotyped, habitual, and familiar approaches that may be maladaptive in the situation. Secondly, excessive tension may so interfere with the perceptual processes as to considerably reduce problem-solving efficiency. The necessity for responding immediately may affect both the perception of the stimulus situation and the adequacy of the responses. This inability to be problem oriented may thus arouse concern for one's own psychological well-being, with increasing concern about self-adequacy for meeting the situation. From this we come to Hypothesis II: *If anxiety is above individual threshold, the individual becomes self-engrossed and concerned with his personal adequacy.*

To obtain an index of individual anxiety-readiness level, two Rorschach experts were asked to rank the 11 protocols in terms of this threshold. Individuals with a high readiness level, it was postulated, would be more sensitized to situational factors, and would be thrown into a disturbed state on less provocation than individuals with low anxiety readiness. The rank-order reliability of the two ratings (.80) was significant at beyond the 1 per cent level with 9 df. After the 11 subjects had been as-

signed pooled ratings on the basis of these judgments, they were divided into three groups taken as having low, average, and high anxiety readiness.

B. The Class Situation

Anxiety as a constructive agent accompanies adaptive striving by the total personality. It is conceivable that variation in classroom methods of treating the course materials may tap different levels of individual anxiety reactions. The lecture class, for example, represents a clearly defined stimulus situation in which the student need only sit and listen; he is not required to submit verbal evidence of comprehension.

The discussion classes in the College, on the other hand, present the student with a very different situation. Here the student is expected to prepare in advance, and to participate in discussing and solving the problems raised. There is the constant likelihood of being called upon to offer interpretations of ideas and concepts. It is important for the student to attack the problems correctly, since his treatment of any question is available for all class members to judge and evaluate. Motivation is ordinarily supplied by some form of tension or mild anxiety, and it may be assumed that the anxiety-relief attendant upon correct responses will constitute a positive reinforcement for the individual. This relief, however, is usually only temporary, for the anxiety may be rearoused by the anticipation of being called again where he might fare badly, and accordingly suffer deflation of self-esteem in the eyes of his classmates.

C. Evidences of Anxiety in the Test Situation

1. *Aptitude Tests.* The ACE provides two scores for each student: Linguistic (L) and Quantitative (Q). The L score represents knowledge of vocabulary and the ability to reason with words; the Q score measures skill and speed in arithmetical computation, numerical reasoning, and rather high-level nonnumerical reasoning. The Reading test given each College applicant calls for the use of verbal skills and inductive reasoning. The Writing test, more structured than the Reading, calls for the correction of poor grammar or errors in other aspects of the mechanics of writing. In the Reading test particularly, the student is faced with a situation calling for improvisation under the pressures of situational anxiety. The obtained correlations are presented in Table 1.

TABLE 1

Rank-Order Correlations between Entrance Test Performance and Anxiety Readiness, Rigidity, and Negativism

Variable	Anxiety	Rigidity	Negativism
ACE: L Score..	−.37	.23	.20
ACE: Q Score..	−.39	.31	.16
Writing Test ...	−.40	.11	.19
Reading Test...	−.66*	−.16	−.04

* Significant at the 5 per cent level of confidence.

The values in Table 1 tend to support our first hypothesis: namely, that the ability to improvise with new materials decreases as the individual's anxiety-readiness level increases. The causation is probably circular, for poor ability may lead to anxiety as well as vice versa.

2. *The Comprehensive Examination.* Some parts of the Social Science examination represent subject-matter divisions while other parts are more specifically functional, in the sense that they tap relatively specific abilities and skills developed in the course. The parts range from the recognition-recall of factual material to the ability to apply methods

developed in the course to the handling of new materials. It should be noted that the student's course grade is determined solely by his performance on this comprehensive examination. Thus, his future in the College, as well as chances for scholarships and other awards, are all dependent on the results of these tests.

The Social Science examination in 1950 consisted of eight parts in dealing with the topics covered. These have been arranged here in four areas, each area designed to test the different types of required cognitive processes fostered by the College program. These include:

Part I. Recall through recognition of either (*a*) facts and generalizations about American history, or (*b*) the general nature of an author's position.

Part II. Analyze and interpret, either the papers read in the course or similar papers. This includes the ability to (*a*) identify the main argument of the presentation or discussion, or (*b*) recognize the kind of argument for policy of general views expressed by the author.

Part III. Compare authors, i.e., identify similarities and differences (*a*) as to how issues are defined, or (*b*) as to arguments and conclusions.

Part IV. Express in writing (*a*) simple analysis of any historical period studied; (*b*) the student's critical judgment on a problem relative to those dealt with in the course.

Considering the stressfulness of this test situation, we would predict from our first hypothesis that problems containing unfamiliar subject material would be less adequately handled than structured and familiar problems. The correlations between anxiety-readiness level and performance on the four areas of the Comprehensive are shown in Table 2.

Part I, which requires only the recognition of correct factual alternatives, is the only one of the four which correlates positively with anxiety-readiness level. Part III, calling for independent preparation of materials prior to organizing and interpreting them on the examination, correlates negatively and significantly with the anxiety ratings. The coefficients for Parts II and IV indicate that when called upon to interpret the general views of a particular writer, or to treat narrow topics in a defined manner, those students whose anxiety is easily elicited perform less ably. The obtained results thus bear out predictions based upon an a priori classification of examination materials.

TABLE 2

RANK-ORDER CORRELATIONS BETWEEN ANXIETY READINESS, RIGIDITY, AND NEGATIVISM AND THE FOUR PROCESSES TESTED ON THE SOCIAL SCIENCE I COMPREHENSIVE

Part	Process	Anxiety	Rigidity	Negativism
I	Recall through identification	.34	.73*	.03
II	Analyze and interpret course materials	−.48	.20	−.09
III	Compare authors read in and out of the course	−.61*	−.71*	.21
IV	Express in writings critical judgments on problems relative to those in the course	−.42	−.71*	−.03

* Significant at the 5 per cent level of confidence.

In summary, individual susceptibility to anxiety varies inversely with the ability to reorganize or to make fresh attacks on familiar topics. It would appear that high anxiety has deleterious effects upon the ability to *improvise or change* set.

D. The Conscious Thoughts

It was previously hypothesized that a relationship may exist between the amount of thinking the individual does

about himself and his susceptibility to anxiety. A rank-order correlation of .65 (significant at the 5 per cent level) was obtained between the Source of Thought classification *Self* and anxiety threshold. The frequency of those thoughts grouped under *Concern about the Self* correlated .47 with anxiety. These coefficients suggest that the anxious individual is troubled with feelings of personal inadequacy. Consequently, we should predict that anxiety will vary directly with negatively directed thoughts and self-confidence. To test this, the classification *Concern about the Self* (See Appendix A) was divided into "positive" content units (e.g., personal adequacy, feelings of intellectual superiority) and "negative" content units (e.g., those related to inferiority feelings).

The obtained correlations, −.33 with feelings of adequacy and .60 with feelings of inadequacy, support our initial hypothesis concerning the direction of thoughts about the self, and appear to indicate a withdrawal into the self.[8]

These results suggest that other kinds of withdrawal from the threatening class situation may also occur. Thus we might expect that the higher the anxiety readiness, the more the individual will attend to objects in his environment, rather than to the subject matter itself. The obtained rank correlation between anxiety level and the frequency of attention to irrelevant concrete objects in the classroom was .55, while the correlation with thoughts about the subject matter was only .10. Since the objects in the class are quite structured, definite, and unchallenging, it is possible that they become anchorage points lending themselves to remove the individual from the class material.

It is assumed that the individual confronted with a threatening situation fears his inability to cope with that situation, as well as future occurrences of similar threats. Consequently, it is plausible that the individual will attempt to forearm himself for a class discussion by looking through notes, reading the text, or computing answers in anticipation of being called on to recite. This formulation is supported by the positive correlation of .32 obtained between anxiety-readiness level and these kinds of class activities.

Since the ability to deal with new ma-

[8] The first class session recorded was oriented towards individual performance on an assigned essay. Students with varying levels of anxiety readiness were concerned with their grades and performance. The following excerpts are selected from the interviews with students having high, average, and low anxiety readiness:

High Anxiety Readiness

Ernest: "I was concerned about my essay. I had quite a terrible grade on it. I wondered whether or not I should speak to him [the instructor] after class, or call him at home this evening. I was also interested in the others' grades."

Average Anxiety Readiness

Robert: "My primary concern was my own paper. I looked at it; I was apprehensive as to what I should do. I was really very worried as whether or not I had gotten my idea in writing. This was intensified by his example, about how this girl did put her thoughts down. I was confused as to his grading system. I didn't know how well I did even after I got my paper back."

Jack: "I thought of my essay. It seemed inadequate to him, therefore, later to me. I was concerned with evaluation, and therefore, I listened to him. . . . I wondered who had written this essay he had read. I wondered if the other essay I wrote in a personal tone wouldn't have been better than this impersonal one that I handed in. . . . I wondered what Frances' grade was."

Low Anxiety Readiness

Frances: "I was thinking of my paper. I was concerned about it. I had seen it and wasn't enthused about it. It was rather short."

terials and organizational problems is somewhat suppressed by high anxiety, little attempt to relate old class materials to new subject matter is expected. The relevant correlation of −.70 was significant at beyond the 5 per cent level.

It will be remembered that the problem-solving category developed had been divided on an a priori basis into two categories: (*a*) the ability to give factual answers; and (*b*) the ability to relate and synthesize materials. Anxiety might be expected to correlate positively with the former kind of ability, since previous preparation would enable the student to make correct responses. It should be noted, however, that we were not concerned with the actual correctness of the reported answers, but were interested only in the efforts made in that direction. However, the obtained correlations, .44 with the whole category of problem solving, −.47 with application, and .24 with solutions, though suggestive, are not statistically significant.

In summary, the data obtained from the reported conscious thoughts indicate that if anxiety is aroused beyond the individual's threshold, responses which obtain tend to be stereotyped and readily available. When new approaches to familiar material or new materials are called for, response is made via familiar and habitual approaches, the anxious individual being less capable of improvising in the situation. In addition, withdrawal from the situation may take place in the form of concern with concrete objects in the class situation, or in terms of self-engrossment in the direction of concern with self-inadequacies.

E. Discomfort-Relief Quotient

The discussion thus far has been concerned with the correlates of anxiety level and the anticipatory nature of anxiety. It may be assumed that it is the poorer student who is most affected by anticipatory anxiety, and who may, consequently, tend to have a higher anxiety-readiness level. However, the scholastically superior student may be equally uncomfortable in the classroom situation, though for a different reason. He may be bored and impatient to proceed to a more challenging consideration of the subject matter. Whereas the discomfort of the poor student may result from anxiety due to feelings of inadequacy, the discomfort of the good student may result from lack of stimulation or boredom.

To test this hypothesis, the 11 subjects were divided into three groups on the basis of the final grades obtained in Social Science I: the *A-B* group, the *C* group, and the *D-F* group. As shown in Figure 1, the mean DRQ's for both the high and low groups are not significantly different. As anticipated, the good and the poor students are the ones who experience the greatest amount of class dissatisfaction.

When the mean DRQ's were computed for groups divided on the basis of performance on entrance examinations, the results obtained for both the Reading test and the ACE examination followed the pattern found with course grades (see Fig. 2). For the Writing test, however, DRQ varied inversely and in a linear, rather than the U-shaped fashion, with test performance. The average student for the group, while he may experience discomfort, is the one whose understanding is met somewhat by the class discussion. In other words, it is possible that the obtained relationships indicate that the class situation is geared to the middle student at the expense of losing the good and poor student by boredom for the one and difficulty for the other.

Finally, the DRQ correlated −.64 with ratings of anxiety-readiness level. This coefficient, significant at beyond the 5 per cent level, suggests that the individual may develop various mechanisms, such as withdrawal or repression, to prevent his anxiety from reaching consciousness.

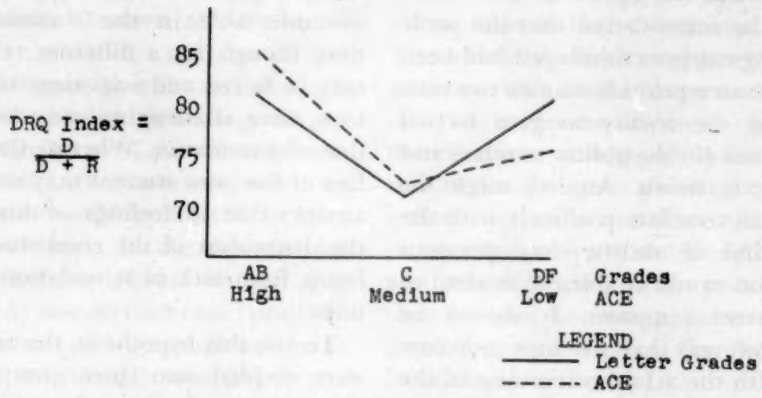

FIG. 1.—Group mean DRQ plotted against Social Science I grades and ACE score; groups High, Medium, and Low.

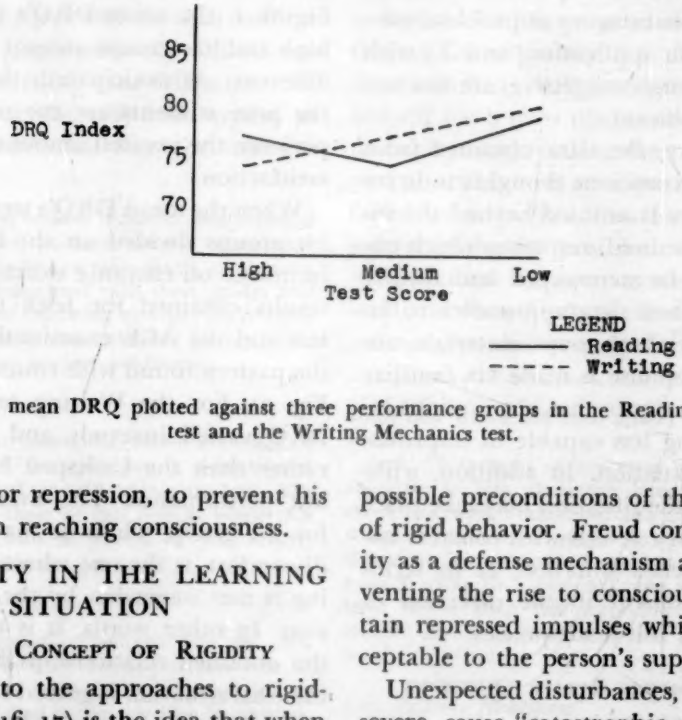

FIG. 2.—Group mean DRQ plotted against three performance groups in the Reading Achievement test and the Writing Mechanics test.

V. RIGIDITY IN THE LEARNING SITUATION

A. THE CONCEPT OF RIGIDITY

Common to the approaches to rigidity (8, 9, 15, 16, 17) is the idea that when the values of the individual are threatened or are especially vulnerable to attack, often because of environmental contradictions, he is relatively less able to adapt to a new situation. Intense emotional involvement and concreteness of behavior are observable correlates and possible preconditions of the occurrence of rigid behavior. Freud conceived rigidity as a defense mechanism aimed at preventing the rise to consciousness of certain repressed impulses which are unacceptable to the person's superego values.

Unexpected disturbances, if sufficiently severe, cause "catastrophic reactions" (9) which are repetitive and stereotyped by virtue of their dependence upon the

individual's long-standing security patterns. Accordingly, the individual with a low "catastrophic threshold" tends to avoid those situations requiring spontaneity and variability of response. He seeks out and functions best in a highly organized, unchanging environment. In the light of this, we set up our three hypotheses for investigation here: Hypothesis I: *The greater the predisposition towards rigidity, the more likely will the individual fixate on a response, and not alter it, especially in the direction of the class material.* Hypothesis II: *The greater the predisposition to rigidity, the less able is the individual to organize material in a stress situation. He can, however, cope with structured and available concrete materials.* Hypothesis III: *In the general situation, the greater the individual's predisposition to rigidity, the more will he relate situational changes to himself.*

B. A Measure of Rigidity Predisposition

On the Rorschach record, it has been noted (11, 12) that rigid subjects tend to minimize movement, color, shading, and perspective responses. Their responses are impersonalized, constricted, tend to be few in number, and are usually concentrated on the last few cards.

Responses showing good form ($F+$), but without shading, indicate poor ability to relate oneself satisfactorily to people and social institutions. Klopfer and Kelley (11) assert that the control of any subject of above-average intelligence whose record contains more than 50 per cent F, can be called constrictive. It may be assumed that the more closely the percentage of $F+$ responses approaches one hundred, the higher is the degree of rigidity.

The percentage of animal responses (A) appears to follow the general pattern of inhibition versus impulsiveness as revealed in the rest of the Rorschach record. In general, a high $A\%$ tends to indicate inhibition, rigidity, or a narrow range of interests.

In the present study, two Rorschach experts were asked to rank independently the 11 protocols along a continuum of predisposition towards rigidity. The obtained rank-order correlation of .75, computed as a measure of rater reliability, was significant at beyond the 5 per cent level. After the pooled ratings obtained in this manner had been assigned, the subjects were divided into high, average, and low groups on the basis of their apparent predisposition to rigidity.

C. The Test Situation

1. *The Aptitude Tests.* It has been postulated that the emotional reactions elicited in a test situation may tend to constrict the individual and interfere with his cognitive performance (15, 17). From our second hypothesis, we would predict a positive relationship between rigidity and the ability to deal with concrete materials. The low positive correlations which were obtained between rigidity on the one hand, and the ACE scores and the Reading and Writing tests on the other are presented in Table 1. Since each of these tests depends at least partially on recall without organization, the results are in line with our expectations. With only one exception, all of the coefficients obtained are low but positive.

2. *The Comprehensive Examination.* The parts of the comprehensive examination in Social Science I offer another area in which to test our second hypothesis. The obtained correlations between rigidity and performance on each of the four areas of the Comprehensive are presented in Table 2.

The index for Part I suggests that as

rigidity increases, so does the ability to deal with structured, familiar material in a stress situation. The value of rho (.73) is significant beyond the 5 per cent level. However, this increase may not continue indefinitely; for rigidity becomes maladaptive when extreme. Within limits, however, the above trend is quite probably effective. It should be noted that Part I calls merely for recognition of previously learned materials with little else required.

Part II deals with previously encountered materials, but in a new fashion. It may be assumed that some acquaintance with the manner of subject-matter treatment exists, and that the student has some ability to perform the necessary operations when he enters the test situation. The correlation here is not statistically significant.

The highly significant negative correlations between rigidity predisposition and the *organizational* parts of the examination indicate that rigid individuals lack the ability to use fresh attacks in dealing with such problems. It is possible that these subjects resort to methods proven successful in the past (i.e., "old learning"), when they find themselves unable to deal with the materials in the fashion demanded.

D. *Evidence of Rigidity in the Conscious Thoughts*

Experiences of perseveration of words and phrases in the classroom correlated with rigidity predisposition to an extent represented by a rho of .62, a value significant at the 5 per cent level. These students appear to be still concentrating on material the rest of the class has left, a phenomenon suggesting an inability to tolerate overlapping situations or to respond simultaneously to more than one set of stimuli. It may be that this "need for structure" carries over into the realms of problem solving and evaluative behavior.

Problem-oriented behavior was negatively though not significantly associated with rigidity predisposition (rho = −.14), and correlated positively (rho = .31) with orientation to the ideas under class consideration. It is possible that the more rigid individual tends to be receptive only to those ideas which are clearly defined and structured. Support for this hypothesis obtains from the correlation of .43 obtained between measured rigidity and the frequency with which objects within sight and hearing were perceived. External objects and concrete ideas share in common the attribute of tangibility; they call for little interpretation or projected meaning on the part of the individual. Though its verification must be left to future research, it is reasonable to suppose that the ideational responses of the "stimulus bound" individual may be as rigid and stereotyped as his behavioral responses—that rigid activity implies rigid thought.

Freud has postulated that in order to maintain his repressions, the rigid individual must set up an inflexible system of defenses. Any weakening of the defense mechanisms involves the danger that repressed, unacceptable tendencies may break through into consciousness. The necessity for continuously maintaining his defense system intact may promote in the individual an increasing rigidity and an increasing concern with himself (cf. Hypothesis III).

The interview data indicate that most of this self-directed thinking is concerned with the individuals' own inadequacies (see Table 3). It has been previously noted that the rigid person tends to take refuge in some kind of conformity, e.g., academic conformity. Thus the discrep-

TABLE 3

RANK CORRELATIONS BETWEEN RIGIDITY PREDISPOSITION AND THOUGHTS ABOUT THE SELF AND PEOPLE

Variable	Rho
Total Self	.60*
Self: Negative	.52
Self: Positive	.20
Teacher	−.55
Other students	−.20

* Significant at the 5 per cent level of confidence.

ancy between his social conformity drives and the realities of his own personality characteristics may cause to develop within the individual a negative reaction to himself, a state of affairs designated by Horney (10) as a "sacrificed subjective environment."

The data of the present study indicate that negative thoughts about the self are associated with increasing rigidity predisposition. It is possible that in turning his experiences towards himself, the rigid individual is able to turn away from those areas where his defenses are jeopardized, and thus remain within the narrowly circumscribed areas in which he feels secure.

E. DISCOMFORT-RELIEF QUOTIENT

By becoming more concerned with himself, the individual may psychologically withdraw from the objective situation, thus reducing threat to a minimum. The above results support the hypothesis that as the individual comes into a threatening situation, he will attempt either to withdraw or to introduce stability by clinging to concrete details and familiar objects. These affective elements are so fused into his perception that he becomes part of the external world which changes as these elements shift in *their dynamic relation to him*. If such mechanisms are effective, little discomfort should be experienced in the class situation, for the withdrawal and concrete perception will serve to protect the individual. As anticipated, none of the correlations obtained between rigidity predisposition and parts of the DRQ was statistically significant (Satisfaction = −.05, Dissatisfaction = −.43, Ambivalence = .49, Neutral = .18, and Total DRQ = .21).

If we can assume that rigid individuals tend to internalize threatening environmental stimuli, the negative correlation with dissatisfaction can be partially explained. It must be noted, however, that the DRQ represents a proportion between the amount of discomfort experienced and the sum of both idea units of satisfaction and dissatisfaction. Thus it may be that although the individual is physically removed from the situation, he is not entirely withdrawn from it emotionally, and accordingly continues to experience some discomfort. In line with the above, it may be noted that the correlation between rigidity and ambivalence is the highest of the values obtained for parts of the DRQ classification.

VI. MANIFESTATIONS OF NEGATIVISM IN THE LEARNING SITUATION

A. A MEASURE OF NEGATIVISM

It is generally conceded that negativism is a learned response that may be aroused in the individual by stimuli perceived as threatening providing that such reactions are not contraindicated by the presence of contrary needs or drives. Rorschach (18) suggested that responses to white spaces (*S*) on the Rorschach cards are indicative of oppositional tendencies. In *S* responses, the relationship between figure and ground is reversed, the ink blot being seen as ground, and the white part of the card as

figure. The 11 records obtained in the present study were rated for negativism by two Rorschach experts. The obtained reliability coefficient of .70, significant at the 5 per cent level, was deemed sufficiently high to justify assigning to each subject the combined rating of the two judges.

B. The Test Situation

1. *Aptitude Tests and Comprehensive Examination.* Tables 1 and 2 present the correlations of the negativism ratings with the aptitude-test scores and comprehensive-examination scores, respectively. Since individual negativism is quite removed and unrelated to the objective criteria that the College sets up to measure the students' ability, whether one scores high or low on the test should make little difference as compared with the amount of individual negativism. As might be expected, all of the obtained coefficients may be accounted for on the basis of chance. It may be hypothesized that the high motivation to succeed, characterizing a competitive situation, tended in this instance to prevent the actual expression of the latent negativism which may have existed. It is also possible that the College student accepts the comprehensive-examination program as part of the educational plan, and displaces his oppositional attitudes from the test situation to areas where grades and class status remain unthreatened.

C. Manifestations of Negativism in the Conscious Thoughts

1. *The Self as a Focal Point.* In the classroom situation, open rebellion against the procedure, the course, the instructor, or other class members is usually penalized in some manner. In such circumstances, the expression of resentment will usually remain covert, and may be directed toward the self. The obtained correlations between ratings of negativism and kinds of thinking about the self tend to bear out this hypothesis. Though not statistically significant, the coefficients suggest that thoughts about the self increase as the individual's oppositional tendencies increase (rho = .34), and that these thoughts tend to grow more self-critical as negativism grows more intense (rho = .52). Negativism and positively directed thoughts about the self are inversely related to a slight degree (rho = −.12). The thinking is mostly about the individual's personal and intellectual adequacy (or inadequacy) related to the other class members.

Moreover, positive thoughts about other people correlated −.45 with negativism, while negative thoughts about others correlated .67, a value significant at the 5 per cent level. In general, those individuals whose Rorschach records showed high negativism also displayed considerable concentration on the inadequacies of both the self and others in the class session, as the following interview excerpts indicate:

Ernest:

"Frances . . . she's the smartest one. She is *so* smart. I don't feel prejudiced against them (the smart students) . . . not envious or anything like that. But I do wish that I would answer like that. I do respect them."

"Miss X—— certainly does have her troubles, I thought. And that Max Factor makeup she uses. Heavens, she's practically a flaming siren. Then again, everyone looks at her, and she glances back so suspiciously."

"I wasn't particularly interested in this problem. Instead, I thought of Mr. X—— [the instructor]. His teeth are so yellow; brown eyes with a beautiful parting in his hair. Golly, I wish he wouldn't wear those comical brown shoes . . . they look so cheap and have a rotten polish on them, probably liquid. Also, he stands with his back to the blackboard, so the back of his suit is full of chalk. The tie he wore wasn't half bad, either. Most amusing, I thought was

the way he accentuates his problems . . . always underlining and putting circles around practically everything.

"I felt good that Mark had more criticisms on his paper than I did. He didn't seem too bright to me . . . Stan, oh, he's so smart . . . it burns me up. But he has no moral values . . . runs around . . . for his capacity of IQ, he could rip the class wide open, which he doesn't do. I don't know why. He is so well educated, but he has such low moral values. He doesn't know how to live."

Mark:

"His [Jack's] voice is irritating; the tone of his voice. Sounds like it was coming from deep down and could be very contrasting. When he talks in class, he keeps talking, and never says anything. I thought that Mr. X—— was going to get mad at him one of these days. He wasn't too bad yesterday, I thought. But a lot of times he starts to argue with Mr. X—— just for nothing, after the teacher has given him the right answer."

Jim:

"[I was] thinking about where X—— gets his haircuts and his hats. Thought that they were the worst looking things I've ever seen in my life. He must get them at the Reynold's Club. Everyone who gets a haircut there . . . well, they're lousy."

"I wondered why she didn't stay on the farm. I can't understand why these women don't stay at home and have babies. Thought that she typifies the typical U. of C. coed. Very intellectual and nothing else. I was thinking that this school had the reputation for very homely girls. See these girls walking around with these long, black stockings. Isn't that silly, Good Lord? I noted that Frances had a dress on yesterday. The first time since school began. I was thinking that we could always tell a U. of C. student when they came into our store."

2. *Negativism Directed Against the Subject Matter.* Direct argumentation and contradiction of subject-matter treatment in class may induce more anxiety than the amount of tension dissipated. Hence, we might expect that the student will show his resistance in class in covert ways which will not constitute too much threat for him. The obtained correlations between problem-oriented behavior and ratings of negativism are presented in Table 4. It is interesting to note that as disposition towards negativism increases, a decrease in active problem solving occurs. Moreover, negativism tends to correlate quite highly both with passivity (e.g., following along in the book, taking notes, waiting for new materials to be presented), and with evaluatory orientation (e.g., criticizing the relevancy and cogency of a point made, agreeing or disagreeing with the speaker). These data suggest that the negativism attendant upon poor problem-solving ability tends to be expressed either as dependence (cf. frustration → regression) or as irascibility (extrapunitiveness).

TABLE 4

RANK CORRELATIONS BETWEEN RATINGS ON NEGATIVISM AND PROBLEM-ORIENTED THINKING

Variable	Rho
Problem Solving	−.52
Active Participation (Evaluation)	.62*
Negative Evaluation	.34
Positive Evaluation	−.71*
Passive Participation	.54

* Significant at the 5 per cent level of confidence.

3. *Negativism Directed against Other Class Stimuli.* Cameron (2) contends that the individual may manifest negative attitudes by doing the opposite of what he believes demanded of him. Thus the individual who is negativistic toward the classroom situation may attend to irrelevant thoughts and stimuli rather than to the topics under discussion. Table 5 presents correlations between negativism and degree of irrelevant thinking and activity.

The correlation between oppositional tendencies and the performance of motor acts in class is significant at the 5 per cent level, suggesting that while *passive* in regard to the class material, the student can remain inattentive to it. The

TABLE 5

RANK CORRELATIONS BETWEEN NEGATIVISM AND THINKING AROUSED BY ENVIRONMENTAL STIMULI

Variable	Rho
Thoughts of concrete situations outside the class	.65*
Thoughts about physical activities	.56
Thoughts about objects within sight	.45

* Significant at the 5 per cent level of confidence.

highly significant correlation (rho = .80) between negativism and distractibility lends further support to this hypothesis. The index of distractibility used was the sum total of those ideas experienced during the class session which were *not* stimulated either by the topics actually discussed, by ideas directly related to those topics, or by the individuals' own feelings about them. These coefficients suggest that negativism which has been inhibited nevertheless tends to manifest itself both ideationally and behaviorally.

D. DISCOMFORT-RELIEF QUOTIENT

The initial class used in this investigation was recorded during the first week of attendance in the College. Materials and ideas at variance with the student's previous attitudes, values, and general orientation were presented. The following quotations, selected from the first recorded class, are presented to point up the climate being set up by the instructor:

"Do I—do I pose the problem correctly? Now, I'm asking you, I'm asking your cooperation on this matter. I suppose a good number of you probably share the first part of the belief, and probably agree with the basis of government. . . . Is this argument a hard fact we've got to recognize as a consequence of our system? Or is there something wrong with the argument? I don't know. Did I make the argument clear? What's the answer?"

• • •

"That makes a good deal of sense. . . . Any other questions on the questions? Well, Stan, you take it away now and tell me, let's talk this down. I'll try to be quiet; about—in twenty minutes—I'm going to come back in and see what we've learned and what we've got. Go ahead, Stan."

While these two excerpts appear to indicate a permissive and accepting classroom climate, the magnitude of the correlation between negativism and the DRQ for this class was quite high (rho = .57). This value was not even approximated for any of the other classes. But if this was the classroom climate, why was such a high coefficient obtained? It is possible that this result is attributable to the unfamiliar, "progressive," and perhaps threatening nature of the new material presented. As the course progressed, the students may have adapted to the "startling" character of the class work, or have been able to find some way of satisfactorily venting their negativistic feelings, thereby relieving their discomfort.

The trend of correlation values in time is not particularly consistent. Hence, it might be fruitful to inspect the individual records of the three students rated highest on negativism and attempt to seek out the dynamics of the qualitative shifts which took place during the period of investigation.

E. *Individual Patterns*

Table 6 contains indices for the three individuals rated highest on negativism as inferred from the Rorschach record. This table is of interest in pointing to the directions which individual negativism may take. Ernest ranked highest in the group of 11 subjects in orientation to people, the self, the instructor, and the class group, as well as next to the highest in thoughts about the class process. He received a *C* in the course, and his concern with class activity is low;

in fact, all of the values are almost equal. Mark, while concerned with activities distracting from the class topics, failed the course. Jim directed his opposition towards people and objects *removed* from the class situation, as well as to ideas related but not directly bearing on the immediate subject matter. In spite of this orientation, his course grade was a *C*. Thus, we can see three differing patterns, each unique for the individual, adding support to the trends of negativism discussed above.

TABLE 6

PERCENTAGE OF IDEA UNITS RANKED WITHIN EACH CATEGORY BY THE THREE MOST NEGATIVE SUBJECTS

Source of Thought	Ernest	Mark	Jim
Material under discussion	2.0	5.0	3.0
A related idea	2.5	6.5	11.0
Activity related to class (reading-writing)	2.5	11.0	2.5
Self	11.0	9.5	3.0
Instructor	11.0	4.0	1.5
Other students	11.0	3.5	8.0
Object within sight or hearing	7.0	11.0	2.5
Classroom situation or process	10.0	1.0	3.0
Someone not in the classroom	7.5	2.0	11.0
Object or situation outside the immediate environment	4.5	8.5	10.0

VII. SUMMARY AND CONCLUSIONS

This study has been concerned with investigating the relationships between individuals' recalled experiences in a series of class situations and certain relatively stable personality characteristics as inferred from Rorschach protocols. More specifically, the following questions were investigated:

1. What is the relationship between selected personality characteristics (viz., anxiety, rigidity, negativism) and the kinds of thinking done by a group of college students in the learning situation?

2. What is the relationship between selected personality characteristics and products of learning, where such products can be inferred from test performance?

The majority of the data used in the present study were obtained by the *method of stimulated recall* recently introduced by Bloom (1). This involved recording 12 Social Science I class discussions in which the subject was a participant. Within a 48-hour period following the class meeting, each student was individually interviewed and the class recording was played back to him. During the interview, the recording was stopped at specific, preselected points (here called critical points) and the student was asked to recall the experiences he had during the actual situation. The ideas or thoughts reported during the series of weekly interviews were recorded verbatim and constituted the *conscious ideas* for this investigation. These data were collected through 64 interviews conducted over a four months' period with 11 students from one intact Social Science I class, registered for the first time in the College of the University of Chicago.

A. The unit of response classified was a statement, clause, or phrase denoting a complete idea; each such unit was termed an *idea unit*. The following system of

classification for the reported conscious ideas was developed: (*a*) the stimulus or source of the experienced idea, called the *source of thought;* (*b*) the orientation or character of the idea unit, called the *orientation of thought;* and (*c*) the hedonic tone of the idea unit: this was a modification of the Discomfort-Relief Quotient (DRQ) developed by Dollard and Mowrer (5).

B. Performance on the Social Science I comprehensive examination was classified according to the type of required cognitive process called for on the examination. The Rorschach protocols were independently rated by two experts on anxiety readiness, rigidity predisposition, and negativism; in each case, a high score means *much* anxiety, rigidity, or negativism. The obtained reliability coefficients between judges' ratings based on the Rorschach were .80, .75, and .70, respectively.

A. Results

1. Anxiety readiness is negatively related to general level of performance on tests of scholastic aptitude. (Rho = −.37 with the ACE, −.66* with a reading test, and −.40 with a writing-mechanics test.)

2. When an analysis was made of the comprehensive examination, anxiety was found to relate positively only with the part calling for rote recall, rho = .34. Negative values were obtained with those parts calling, respectively, for analysis of familiar materials (rho = −.48), for comparisons of familiar and unfamiliar materials (rho = −.61*), and for critical evaluations of new materials (rho = −.42).

3. High anxiety readiness characterized those individuals who spent a great amount of time in class thinking about themselves in negative terms (rho = +.60*).

4. Rigidity predisposition, as inferred from the Rorschach, correlates positively with performance on materials calling for rote recall through identification (rho = .73*), but negatively with treatment of concepts or problems dissimilar to those previously studied (rho = −.71*), and those problems requiring new modes of attack (rho = −.71*).

5. In class rigidity predisposition is positively correlated with thinking about class stimuli most readily available, and with thinking about the self in negative terms (rho = .52).

6. Chance relationships were found between negativism and performance on different parts of the aptitude or achievement tests.

7. From the reported class experiences, evidence was found to indicate that negativism may be manifested in several ways. Values significant at the 5 per cent level were obtained between negativism and idea units concerned with negative and critical thoughts about other people (rho = .67*), and criticism of ideas expressed in class (rho = .62*). Negative thoughts about the self were highly, but not significantly, correlated with negativism (rho = .52).

B. Conclusions

The obtained results, while not definitive, strongly suggest the existence of relationships between certain personality, learning, and achievement variables. The following conclusions appear tentatively justified:

1. Anxiety and rigidity characterize those individuals less capable of improvising in a new problem situation. While problems calling for recall

* Significant at the 5 per cent level of confidence.

through recognition can be dealt with effectively, it is the organizational rather than the stereotyped behavior which is predominantly influenced by these personality variables.

2. Personality variables appear to be involved as influences in cognitive operations. These relationships, in the test situation, are demonstrable only when ability-test items are classified and analyzed *separately by type of required cognitive process.* . .

3. The obtained results carry implications for the measurement of personality through cognitive-ability tasks.

4. The conscious thoughts, as made available by the method of stimulated recall, open a vast new area for investigation. Research concerning the use of this technique is important in view of its potential application. Investigators in social psychology, group dynamics, and other fields will find the method a useful tool for research. The special merit of this methodology is that it permits the individual to participate freely in discussion or other social situations at one time, and to serve as an observer of his mental activity in the discussion at another time. Since the interviews are conducted after the completion of the social situation, they can have no effect on it. If future studies confirm our exploratory studies as to the accuracy and the detail with which the recall is stimulated by the recordings, this should prove a most useful method of inquiry in the social sciences. There has long been a need for a technique in the social sciences in which the act of investigation would have little or no effect on the situation being investigated. In general, the method of stimulated recall should be useful in many investigations of the relations between overt and observable behavior and the more subtle thought processes of which the individual is conscious.

The major result of the present investigation has been the demonstration that the conscious experiences of a group of students in a series of class sessions over a period of time, as well as performance on certain objective tests, are related to certain personality characteristics. The results are in accord with the view that no learning (with the possible exception of the conditioned-reflex type of learning) can be properly evaluated without regard for the personality of the learner. This is in sharp contrast to the early but persistent differentiation of behavior into cognition, conation, and affection, which are assumed to operate in virtual independence of each other.

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Appendix

CLASSIFICATION OF ORIENTATION OF THOUGHT[1]

I. Participation

A. *Active Participation*[2]

Synthesis

9. Reconciliation of conflicting points
8. Relating discussion to general problem
7. Relating specific to some abstraction

Solution

6. Answer problems or questions raised

Application

5. Applies solution and/or idea—nonacademic
4. Applies solution and/or idea—other academic material
3. Applies solution and/or idea—in present course material
2. A related question or problem is raised
1. Searching for relevant point in the text or notes

B. *Evaluation*

7. Evaluation of aesthetic qualities
6. Evaluates the complexity and meaningfulness of the question or answer
5. Evaluation of the class process or procedure
4. Evaluated accuracy or authenticity of point or illustration
3. Evaluates relevance or cogence of point or illustration
2. Agrees with point or illustration
1. Disagrees with point or illustration
0. Surprised by point or illustration

C. *Comprehension*

7. Desires classification of a point
6. New insight or understanding: reorganization of his ideas on the subject
5. Recall of previously related experience or situations
4. Illustrates or relates it to another situation: nonacademic
3. Illustrates point or relates it to another situation: other academic material
2. Illustrates point or relates it to another situation: in course materials
1. Anticipates or wants a particular illustration given

D. *Passive Participation*

6. Curious as to what will be said
5. Simple understanding; following and listening with simple comprehension
4. Following and listening without comprehension
3. Following in book
2. Taking notes or following with book
1. Just following or listening; paying attention
0. Keeping ideas in mind, but also paying attention to other things

II. Diversions

A. *Individuals and Their Personal Characteristics*

8. Instructor's characteristics and mannerisms: approval, positive
7. Instructor's characteristics and mannerisms: disapproval, negative
6. Instructor's characteristics and mannerisms: nonevaluative and/or empathetic
5. Student speakers' characteristics and mannerisms: approval, positive
4. Student speakers' characteristics and mannerisms: disapproval, negative
3. Student speakers' characteristics and mannerisms: nonevaluative and/or empathetic
2. Other person's characteristics and mannerisms: approval, positive
1. Other person's characteristics and mannerisms: disapproval, negative
0. Other person's characteristics and mannerisms: nonevaluative and/or empathetic

B. *Ideas and Words*

3. Captivated or attracted by unusual word or phrase or idea or name
2. Amused by a remark
1. Annoyed or bothered by a remark
0. Tangential thoughts stimulated by word, phrase or idea

C. *Concern about the Self*

9. Desire of knowledge about self, e.g., grades
8. Concern about details of the self and activities; care of self
7. Feeling of personal adequacy: related to personal characteristics
6. Feeling of personal adequacy: superiority over someone in class, student or instructor, and related to discussion
5. Feeling of personal adequacy or positive attitude towards self: agreement with the speaker, and other people
4. Feeling of personal adequacy or positive at-

[1] The number placed before each category does not have any value except to facilitate ordering of the data.

[2] Involves the actual doing or effort, and not success of the action (such as giving the correct answer, accurate evaluation, etc.).

titude towards self: knowing the answer, comprehension or knowledge
3. Desires opportunity to demonstrate personal adequacy on a particular point by overt participation
2. Concern about possible demonstration of personal inadequacy: possibility of being called on to recite; wishes to avoid overt participation which will be judged
1. Concern about inadequacy of self: related to personal characteristics
0. Concern about inadequacy of self: related to discussion and subject matter presented

D. *Other Activities*

9. Tangential thought unrelated to the classroom stimuli
8. Not paying attention
7. Remembers the critical point, but cannot recall his thoughts of the time
6. Difficulty in hearing
5. Absent at this critical point
4. Looking at some object
3. Overt verbal participation in discussion
2. Speaking to someone in the class, not reciting
1. Occupied with other details: arranging books, clothing, getting organized
0. Reading

III. No Recall